

Curriculum Vitae of Prof. Gianmario Martra

Scientific education

1990-1993: PhD in Chemical Science, Interuniversity Consortium Genova-Pavia-Torino. Title of dissertation: "Electronic surface states of materials with high specific surface area"

1984-1989: degree in Industrial Chemistry at the University of Torino; grade: top marks with magna cum laude

Academic career (at the University of Torino; discipline: Physical Chemistry)

2016 (December)-present: Full Professor

2001-2016 (November): Associate Professor

1998-2001: Senior Assistant Professor

1995-1998: Assistant Professor

Periods spent at foreign Universities

2013 (June): invited professor at the Université P. et M. Curie, Paris VI, Surface Reactivity laboratory

2001 (December)-2002 (April): invited scientist at the Osaka Prefecture University, Dept. of Applied Chemistry, Laboratory of Heterogeneous Photocatalysis (Director: Prof. Masakazu Anpo)

1999 (December)-2000 (April): invited scientist at the Meisei University (Hino – Tokyo), Global Environment Protection Laboratory (Director: Prof. Hisao Hidaka)

1995-1996: post-doc at the Université P. et M. Curie, Paris VI, Surface Reactivity Laboratory (Director: Prof. Michel Che, winner of the 2008 Chinese Academy of Sciences (CAS) Gold Medal, 2009 Int'l Science & Technology Cooperation Award, 2018 China-France Chemistry Lectureship Award).

Roles and responsibilities in Scientific Societies

2017-2019: President of the Piedmont region Section of the Italian Chemical Society

2016-2018: member of the national board of the Physical Chemistry Division of the Italian Chemical Society

Academic responsibilities at the University of Torino

Research responsibilities

2016-present: chair of the PhD program in Pharmaceutical and Biomolecular Sciences (www.dott-sfb.campusnet.unito.it)

2015-present: scientific manager of the Laboratory of Electron Microscopy

2015-present: member of the Research Board of the Department of Chemistry

2014-present: member of the Scientific Board of the Interdepartmental Centre "Nanostructured Interfaces and Surfaces – NIS" (www.nis.unito.it)

2001-present: member of the Scientific Board of the Interdepartmental Centre G. Scansetti for the study of asbestos and other toxic particulates (www.centroscansetti.unito.it)

Educational responsibilities and duties

2010-2016: president of the Master course in Clinical, Forensic and Sport Chemistry

2003-2009: president of the Master course in Industrial Biotechnology

Bachelor and Master courses

Since 1998, Prof. Gianmario Martra is teaching Physical Chemistry related topics (spectroscopy, electron microscopy, self-assembly, nanomaterials) at the Bachelor Course in Chemistry and at the Master Courses in Clinical, Forensic and Sport Chemistry, Industrial Biotechnology and Molecular Biotechnology

Tutoring for final dissertation:

Bachelor: 16

Master: 52

PhD courses and schools

National PhD programs

2000-present: 9 short courses for PhD programs at the University of Torino, Milano (2000), Messina (2006)

Polytechnic of Torino (2015, 2018)

International PhD Schools

2012-2014: lectures at the International Summer School "Nanotechnology: from fundamental research to innovations", held in Ukraine in the frame of the EU FP7 project Nanotwinning

(www.iop.kiev.ua/nanotwinning)

Supervision of PhD projects: 11 at 100% responsibility, and 10 at 50% responsibility

Organization of international schools

- Director of the International Summer School "Nanoscience meets Metrology. Synthesis, Characterization, testing and Applications of Validated Nanoparticles", Torino, 4-9 september 2016 (<http://www.metecnetwork.eu/setnanometro-project>).

- Chair of the Organizer Committee of the International Winter School "Molecules@Surfaces", Bardonecchia (TO), 31/01-5/02 2016 (www.nis.unito.it/ispc2016)

- Member of the Scientific Board of the International Summer School "NANOTECHNOLOGY: from fundamental research to innovations", Ukraine (3 editions: 2012-2014)

(<http://www.iop.kiev.ua/anothwinning>)

Research activity and interests

The scientific activity of Prof. Gianmario Martra is focused on the investigation of the physic-chemical and chemical events resulting from the interaction of molecules with the surfaces of nanomaterials. Molecules range from probes for the detailed elucidation of nature and structure of surface sites, to reactants relevant for sustainable chemical processes or environmental remediation processes, to biomolecules involved in natural phenomena and/or biomedical and biotechnological issues. In particular, in the last 5 years, Prof. Martra was exploiting his scientific expertise in the investigation at atomic/molecular level of surface states and reactivity of nanocatalysts for an innovative approach to challenging aspects of the elucidation of nanomaterials-biomolecules interactions, targeting both fundamental science and technological achievements. One of the two main topics is the formation of C-N bonds in a "atom economy regime" from unactivated reactants, in particular amide and peptide bonds, of crucial importance in fine chemistry (Pattabiraman V. R. & Bode J. W., "Rethinking amide bond formation", *Nature* 480, 471-479 2011). The level of success of the fundamental investigation is witnessed by the papers appeared in *Angewandte Chemie International Journal* (G. Martra, C. Deiana, Y. Sakhno, I. Barberis, M. Fabbiani, M. Pazzi, M. Vincenti, "The Formation and Self-Assembly of Long Prebiotic Oligomers Produced by the Condensation of Unactivated Amino Acids on Oxide Surfaces" 54, 4671-4674, 2014), awarded as Hot Paper and with the inner cover of the issue, and in *ACS Catalysis* (A. Rimola, M. Fabbiani, M. Sodupe, P. Ugliengo, G. Martra, "How Does Silica Catalyze the Amide Bond Formation under Dry Conditions? Role of Specific Surface Silanol Pairs", 8, 4558-4568, 2018).

The other main research topic in the last 5 years is the fate on the interactions between nanomaterials and proteins, with the achievement of a frontispiece for a paper published in *Small* (F. Catalano, L. Accomasso, G. Alberto, C. Gallina, S. Raimondo, S. Geuna, C. Giachino, G. Martra, "Factors Ruling the Uptake of Silica

Nanoparticles by Mesenchymal Stem Cells: Agglomeration Versus Dispersions, Absence Versus Presence of Serum Proteins”, 11, 2919-2928, 2015).

Recognitions achieved by other recent papers are “On the Simple Complexity of Carbon Monoxide on Oxide Surfaces: Facet-Specific Donation and Backdonation Effects Revealed on TiO₂ Anatase Nanoparticles”, ChemPhysPhysChem, 2016, 17, 1956-1960: Hot Topic in the virtual issue of the Wiley journals on materials, and “Possible Chemical Source of Discrepancy between in Vitro and in Vivo Tests in Nanotoxicology Caused by Strong Adsorption of Buffer Components”, Chem. Res. Toxicol., 2015, 28, 87-91: ranked among the 25 best papers in the ACS virtual issue on toxicology

As a whole, the research work of Prof. Martra resulted in ca. 230 papers, which received ca. 7300 citations, *h*-index = 46 (source: Scopus)-

The research work of Prof. Martra was also presented in **84 contributions to congresses** (44 national and 40 international). Moreover, prof. Martra gave the following **Invited Lectures**:

“Forensic validation of alternative formulations of Luminol”, 5th European Conference of the International Association of Bloodstain Pattern Analysis, Roma, 12-15 May 2015.

“Molecules at surfaces of ceramics nanoparticles” ISTECCNR, Faenza, 24 June 2015.

“Molecular resolution study of the surface structure of nanomaterials by combining experimental and theoretical investigations”, plenary lecture at the Italian-French Days on Chemistry, Torino, 5-6 May 2014 (www.gifc2014.unito.it)

“IR spectroscopy and modeling of adsorbed molecules: advances in probing morphology, topography and reactivity of TiO₂ nanoparticles”, key-note at the XLI National Congress of the Italian Physical Chemistry Division, Alessandria, 23-27 June 2013 (www.chimicafisica2013.unipmn.it)

“Surfaces and interfaces of synthetic biomaterials: experimental studies at molecular level”, Max Planck Institute of Colloids and Interfaces, Department of Biomaterials, 24 February 2012

“Surface characterization at molecular level of nanobiomaterials”, Research to Business – 4th Industrial Research Showroom, Bologna, 12 May 2006

“Metal-Oxide Interactions in Confined Nanospaces: Pt and Cs₂O Nanoparticles co-hosted in BEA Zeolite Cavities”, International Symposium ISDAM-2006, Osaka University, 4 August 2006

“Surface sites of nanomaterials: investigation of local structures by combining experimental and theoretical studies”, Congress on Complex Systems: structure, properties, reactivity and dynamics, Alghero (Sardinia), 14 June 2005

“Surface structure and reactivity of MgO: a rich, long lasting research field”, IWOX-4, Aussois (France), 3 January 2005

“Interfacial interactions between oxide particles and aqueous media: the role of the surface structure”, National Microelectronics Research Centre, Tyndall National Institute (Ireland), 11 August 2003

“Lewis acid and base sites at the surface of microcrystalline TiO₂ anatase”, Tokyo Research and Innovation Center, 12 March 2000

“Surface structure of basic oxide nanoparticles”, University of Insubria, 15 March 1999

Roles in international workshops and congresses

- Member of the Scientific Committee of the Italian-French Days on Chemistry, 16-18 April, Genova (Italy), <http://gifc2018.sci-liguria.it/>

- Chair of the Italian-French Days on Chemistry on Nanoscience, 31/01-2/02 2018, Bardonecchia (Italy), <http://www.soc.chim.it/it/sezioni/piemontevd/home>

- Chair of a session of the 13th Europacat Congress, Florence (Italy) 26-31 August 2017 (<http://www.europacat2017.eu/>)

- Organizer of the International workshop “Nanoscience meets Metrology: size and shape engineering of nanoparticles. Towards improved technologies for energy, environment and health”, Erice, 27-31 July 2015, Ettore Majorana Foundation and Centre for Scientific Culture (<http://www.metecnetwork.eu/setnanometro-project>)

- Chairman of the session "Calcium phosphate" of the Materials in Medicine International Conference – MiMe, 8-11 October 2013, Faenza (Italy) (<http://www.istec.cnr.it>)
- Chair of the Organizing Committee of the V International Workshop on Oxide-based Materials & AIZ Days, Torino (Italy), 23-27 October 2012 (www.oxide2012.unito.it)
- Member of the Advisory Board of the 2nd International Congress on Ceramics, Verona (Italy), 29/06– 4/07 2008

National and international grants (as Principal Investigator)

International Projects

PI for the University of Torino (UniTO) of:

- NATO SPS project "A novel method for the detection of biohazards", GA G5291 1/07/2018-30/06/2021
- "ILSES - Metal nanoparticle interactions with bioorganic molecules and their applications in biosensing" Marie Curie action – PIRSES, GA 612620 1/08/2014-31/12/2017
- "SETNanoMetro - Shape-engineered TiO₂ nanoparticles for metrology of functional properties: setting design rules from material synthesis to nanostructured devices", call NMP.2013.1.4-2, GA 604577 1/12/2013 – 31/03/2017: additional roles in the project_ deputy coordinator and risk manager
- "NANOTWINNING - Increase in opportunities for strategic collaboration in the field of nanotechnology via twinning of the Institute of Physics (IOP) of Kiev (National Academy of Science of Ukraine) with institutions of European Research Area", action INCO.2011-6.1 NMP, GA 294952 1/12/2011-31/03/2015

National Projects

PI of "Nanosusleather - Nanomaterials for sustainable leather products", call UniTO-CSP (<https://www.unito.it/ricerca/finanziamenti-la-ricerca/>), 1/05/2017-30/11/2019

PI of "Neurotools - A nanotechnology - neuroscience network: a step forward to the rational design of nanoparticles as tools for neurobiology", CRT foundation 18/09/2014-17/09/2016

PI for UniTO of "AntiBacOss - Development of a multifunctional bone substitute with antibacterial properties" code FA 270-195C POR FESR07/14 23/06/2014-22/06/2015

PI for UniTO of "Greenplasma - A new green and self-controlled plasma treatment of solid and liquid industrial waste" code FA 211-412C POR FESR07/13 15/06/2012-12/06/2014

Project Manager of "NANOPRO: Nanostructured bioceramics for prosthetic orthopaedic and dental application", call CIPE 2006, 1/06/2007-30/05/2010

PI for UniTO of PRIN project "Nature, structure and reactivity of surface centres of various types of natural asbestos and of asbestos modified in controlled conditions", code 2002055875_003 16/12/2002-15/12/2004